EXHIBIT 9

The IEEE Standard Dictionary of Electrical and Electronics Terms

Sixth Edition

Standards Coordinating Committee 10, Terms and Definitions
Jane Radatz, Chair

This standard is one of a number of information technology dictionaries being developed by standards organizations accredited by the American National Standards Institute. This dictionary was developed under the sponsorship of voluntary standards organizations, using a consensus-based process.

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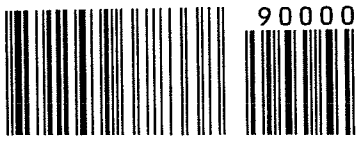

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How to use this dictionary

The terms defined in this dictionary are listed in *letter-by-letter* alphabetical order. Spaces are ignored in this style of alphabetization, so *cable value* will come before *cab signal*. Descriptive categories associated with the term in earlier editions of IEEE Std 100 will follow the term in parentheses. New categories appear after the definitions (see Categories, below), followed by the designation of the standard or standards that include the definition. If a standard designation is followed by the letter s, it means that edition of the standard was superseded by a newer revision and the term was not included in the revision. If a designation is followed by the letter w, it means that edition of the standard was withdrawn and not replaced by a revision. A bracketed number refers to the non-IEEE standard sources given in the back of the book.

Acronyms and abbreviations are no longer listed in a separate section in the dictionary; rather, they are incorporated alphabetically with other terms. Each acronym or abbreviation refers to its expanded term, where it is defined. Acronyms and abbreviations for which no definition was included in past editions have been deleted from this edition of IEEE Std 100.

Abstracts of the current set of approved IEEE standards are provided in the back of the book. It should be noted that updated information about IEEE standards can be obtained at any time from the IEEE Standards World Wide Web site at http://standards.ieee.org/.

Categories

The category abbreviations that are used in this edition of IEEE Std 100 are defined below. This information is provided to help elucidate the context of the definition. Older terms for which no category could be found have had the category "Std100" assigned to them. Note that terms from sources other than IEEE standards, such as the National Electrical Code® (NEC®) or the National Fire Protection Association, may not be from the most recent editions; the reader is cautioned to check the latest editions of all sources for the most up-to-date terminology.

in such sound. *Note:* In practice, crosstalk may be measured either by the volume of the overheard sounds or by the magnitude of the coupling between the disturbed and the disturbing channels. In the latter case, to specify the volume of the overheard sounds, the volume in the disturbing channel must also be given. (PE) 599-1985w

(3) Unwanted electric signals injected into a circuit by stray coupling. (ELM) C12.1-1981

(4) (instrumentation and control equipment grounding in generating stations) The noise or extraneous signal caused by ac or dc pulse-type signals in adjacent circuits. (PE) 1050-1996

(5) (telecommunications) Undesired energy appearing in one path as a result of coupling from another path. Crosstalk is further classified as near-end, far-end, intelligible, or unintelligible. (COM) 1007-1991

(6) (telecommunications) Unwanted coupling between any two paths through the switching system. There are two situations of interest. In the first the crosstalk coupling loss of the system is linear; that is it is independent of applied disturbing signal level and is unaffected by other things, such as circuit noise. The other situation of interest arises with a digital switching system where the crosstalk coupling loss is nonlinear and is a function of applied disturbing signal level circuit noise, and encoder bias. Such systems will, under some conditions of circuit noise and coder bias, display crosstalk coupling loss that tends to decrease with decreasing disturbing signal level. *See also:* crosstalk coupling loss; equal-level crosstalk coupling loss. (COM) 973-1990w

(7) (multichannel) The ratio of the signal induced in one channel to a common signal applied to all other channels. (IM) 1057-1994

(8) The noise or extraneous signal caused by ac or pulse-type signals in adjacent circuits (measurement of power frequency magnetic fields). (PE/T&D) 1308-1994, 644-1994

(9) An electromagnetic field in the space surrounding a cable circuit created by an electrical signal. This field induces currents and electromotive forces in other circuits located close enough to the disturbing cable circuit to be affected. (PE) 1143-1994

(10) (A) A type of noise characterized by unwanted coupling of a signal or the interaction of signals on two adjacent channels. *See also:* near end crosstalk. **(B)** Undesired energy appearing in one signal path as a result of coupling from other signal paths. (C) 610.7-1995

(11) Crosstalk is undesired energy appearing in one signal path as a result of coupling from other signal paths. (C/LM) 8802-5-1995

crosstalk coupling (crosstalk loss) Cross coupling between speech communication channels or their component parts. *Note:* Crosstalk coupling is measured between specified points of the disturbing and disturbed circuits and is preferably expressed in decibels. *See also:* coupling. (EEC/PE) [119]

crosstalk coupling loss (telecommunications) The loss of the crosstalk path. *See also:* crosstalk. (COM) 973-1990w

crosstalk, electron beam (charge-storage tubes) Any spurious output signal that arises from scanning or from the input of information. *See also:* charge-storage tube. (ED) 158-1962w

crosstalk loss *See:* crosstalk coupling.

crosstalk unit Crosstalk coupling is sometimes expressed in crosstalk units through the relation

$$\text{Crosstalk units} = 10^{[6-(L/20)]}$$

where L = crosstalk coupling in decibels. *Note:* For two circuits of equal impedance, the number of crosstalk units expresses the current in the disturbed circuit as millionths of the current in the disturbing circuit. *See also:* coupling. (EEC/PE) [119]

crowbar A protective circuit in a power distribution circuit that rapidly shorts the output voltage to ground when an overvoltage or other error condition occurs. (C) 610.10-1994

CR-RC shaping (1) (charged-particle detectors) (germanium gamma-ray detectors) (x-ray energy spectrometers) The pulse shaping present in an amplifier that has a simple high-pass filter consisting of a capacitor and a resistor together with a simple low-pass filter, separated by impedance isolation. (Pulse shaping in such an amplifier cuts off at 6 dB (decibels) per octave at both ends of the band.) (NPS) 301-1976s, 325-1986s, 759-1984r

(2) (semiconductor charged-particle detectors) In an amplifier, the pulse shaping produced by a single-section high-pass network followed by a single-section low-pass network, with the two networks separated by an isolating stage and with both networks having the same time constant. (NPS) 300-1988r

CRS *See:* configuration report server.

CRT *See:* cathode-ray tube.

CRT display device A display device that displays data onto a phosphor coated display screen using controlled electron beams within a CRT. *Note:* Raster display devices and random-scan display devices are two major categories of CRT display devices. *See also:* dark trace tube display device; penetration CRT display device; raster display device; storage tube display device. (C) 610.10-1994

crude metal Metal that contains impurities in sufficient quantities to make it unsuitable for specified purposes or that contains more valuable metals in sufficient quantities to justify their recovery. *See also:* electrorefining. (EEC/PE) [119]

crust A layer of solidified electrolyte. *See also:* fused electrolyte. (EEC/PE) [119]

CRV *See:* Code Rule Violation.

cryogenics (1) (general) The study and use of devices utilizing properties of materials near absolute-zero temperature. (C) [20], [85]

(2) (laser maser) The branch of physics dealing with very low temperatures. (LEO) 586-1980w

(3) A branch of technology concerned with devices that make use of the properties assumed by materials at temperatures near absolute zero. (C) 610.2-1987

cryogenic storage A type of storage that uses the superconductive and magnetic properties of certain materials at temperatures near absolute zero. (C) 610.10-1994

cryotron (1) A superconductive device in which current in one or more input circuits magnetically controls the superconducting-to-normal transition in one or more output circuits, provided the current in each output circuit is less than its critical value. *See also:* superconductivity. (ED) [46]

(2) A device that makes uses of the effects of extremely low temperatures on conductive materials such that small magnetic field changes can control large current changes. (C) 610.10-1994

cryptographic checkvalue Information that is derived by performing a cryptographic transformation on the data unit. *See also:* cryptography. (C/LM) 802.10-1992

cryptography The discipline embodying principles, means, and methods for the transformation of data in order to hide its information content, prevent its undetected modification, and/or prevent its unauthorized use. (C/LM) 802.10-1992

crystal (A) (communication practice) A piezoelectric crystal. **(B) (communication practice)** A piezoelectric crystal plate. **(C) (communication practice)** A crystal rectifier. (EEC/PE) [119]

crystal-controlled oscillator *See:* crystal oscillator.

crystal diode A rectifying element comprising a semiconducting crystal having two terminals designed for use in circuits in a manner analogous to that of electron-tube diodes. *See also:* rectifier. (EEC/PE) [119]

crystal loudspeaker (piezoelectric loudspeaker) A loudspeaker in which the mechanical displacements are produced by piezoelectric action. (EEC/PE) [119]

crystal microphone (piezoelectric microphone) A microphone that depends for its operation of the generation of an

crowbar A protective circuit in a power distribution circuit that rapidly shorts the output voltage to ground when an overvoltage or other error condition occurs. (C) 610.10-1994

crystal microphone (piezoelectric microphone) A microphone that depends for its operation of the

inside the building below such area, that has no landing opening into the building at its upper limit of travel, and that is not used to carry automobiles. *See also:* elevator.
(EEC/PE) [119]

side-wall pressure The crushing force exerted on a cable during installation. (NESC) C2-1997

sideways sum (mathematics of computing) A sum obtained by adding the digits of a numeral without regard to position or significance. (C) 1084-1986w

siemens (metric practice) The electric conductance of a conductor in which a current of one ampere is produced by an electric potential difference of one volt.
(QUL) 268-1982s

sievert (metric practice) The dose equivalent when the absorbed dose of ionizing radiation multiplied by the dimensionless factors Q (quality factor) and N (product of any other multiplying factors) stipulated by the International Commission on Radiological Protection is one joule per kilogram.
(QUL) 268-1982s

sifting sort *See:* bubble sort.

sigma The term sigma designates a group of telephone wires, usually the majority or all wires of a line, that is treated as a unit in the computation of noise or in arranging connections to ground for the measurement of noise or current balance ratio. (EEC/PE) [119]

sign (1) (power or energy) Positive, if the actual direction of energy flow agrees with the stated or implied reference direction: negative, if the actual direction is opposite to the reference direction. *See also:* network analysis.
(Std100) 270-1966w

(2) (test, measurement, and diagnostic equipment) The symbol that distinguishes positive from negative numbers.
(MIL) [2]

(3) *See also:* electric sign. (NESC) [86]

signal (1) (microcomputer system bus) (signals and paths) The physical representation of data. (C/MM) 796-1983r

(2) (signals and paths, 696 interface devices) The physical representation which conveys data from one point to another. For the purpose of IEEE Std 696-1983, this applies to digital electrical signals only. (C/MM) 696-1983w

(3) (A) (data transmission) A visual, audible or other indication used to convey information. **(B) (data transmission)** The intelligence, message or effect to be conveyed over a communication system. **(C) (data transmission)** A signal wave; the physical embodiment of a message.
(PE) 599-1985w

(4) (overhead-power-line corona and radio noise) The intelligence, message, or effect conveyed over a communication system. (PE/T&D) 539-1990

(5) (programmable instrumentation) The physical representation of information. *Note:* For the purposes of IEEE Std 488.1-1987, this term refers to digital electrical signals only.
(IM) 488.1-1987r

(6) (computers) The event or phenomenon that conveys data from one point to another. (C) [20], [85]

(7) Information about a variable that can be transmitted in a system. (IA) [60]

(8) (telephone switching systems) An audible, visual or other indication of information. (C) [85]

(9) A phenomenon (visual, audible, or otherwise) used to convey information. The signal is often coded, such as a modulated waveform, so that it requires decoding to be intelligible.
(CAS) [13]

(10) (SBX bus) The physical representation of a logical value.
(C/MM) 959-1988r

(11) (STEbus) The physical representation of data.
(C/MM) 1000-1987r

(12) Any communication between message-based devices consisting of a write to a signal register.
(C/MM) 1155-1992

(13) A measurable quantity (e.g., a voltage) which varies in time in order to transmit information. A signal propagates along a wire or an optic fiber. It is interpreted as a sequence of bits, which is grouped into a sequence of characters by the character layer of the protocol stack. Signals are generated by a link output and are absorbed by a link input.
(BA/C) 1355-1995

(14) In networking, an electrical pulse that conveys information through a transmission medium. *See also:* analog signal; baseband signaling; broadband signaling; digital signal; out-of-band signaling. (C) 610.7-1995

(15) (A) A variation of a physical quantity, used to convey data. **(B)** A time-dependent value attached to a physical phenomenon and conveying data. (C) 610.10-1994

(16) A mechanism by which a process may be notified of, or affected by, an event occurring in the system. Examples of such events include hardware exceptions and specific actions by processes or threads. The term *signal* is also used to refer to the event itself.
(C/PA) 1003.5-1992, 1003.5b-1995, 9945-1-1996, 9945-2-1993

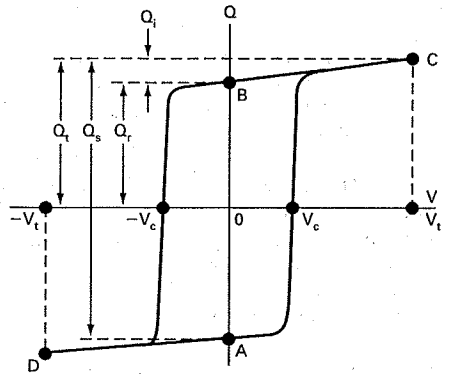
signal, actuating *See:* actuating signal.

signal aspect The appearance of a fixed signal conveying an indication as viewed from the direction of an approaching train: the appearance of a cab signal conveying an indication as viewed by an observer in the cab. (EEC/PE) [119]

signal assertion A) The act of driving a signal to the true state. B) The act of driving a bus of signals to the correct pattern of ones and zeros. (BA/C) 1496-1993

signal back light A light showing through a small opening in the back of an electrically lighted signal, used for checking the operation of the signal lamp. (EEC/PE) [119]

signal charge The charge that flows when the condition of the device is changed from that of zero applied voltage (after having previously been saturated with either a positive or negative voltage) to at least that voltage necessary to saturate in the reverse sense. *Note:* The signal charge Q_s equals the sum of Q_r and Q_t, as illustrated in the corresponding figure. It is dependent on the magnitude of the applied voltage, which should be specified in describing this characteristic of ferroelectric devices. *See also:* ferroelectric domain.



Hysteresis loop for a ferroelectric device.

signal charge
(UFFC) [180]w

signal circuit (1) Any electric circuit that supplies energy to an appliance that gives a recognizable signal. Such circuits include circuits for door bells, buzzers, code-calling systems, signal lights, and the like. *See also:* appliance.
(NESC) [86]

(2) (protective relay system) Any circuit other than input voltage circuits, input current circuits, power supply circuits, or those circuits that directly or indirectly control power circuit breaker operation.
(PE/SWG) C37.100-1992, C37.90-1978s

(3) (protective relay system) Any circuit other than an input voltage circuit, input current circuit, power supply circuit, or an output circuit. (PE) C37.90.1-1989r

signal contrast (facsimile) The ratio expressed in decibels between white signal and black signal. *See also:* facsimile signal. (COM) 168-1956w

signal converter (test, measurement, and diagnostic equipment) A device for changing a signal from one form or value to another form or value. (MIL) [2]

signal current (diode-type camera tube) The change in target current which occurs when the target is irradiated with photons, or electrons, compared to the case where no radiation is incident on the target. (ED) 503-1978w

signal decay time (measuring the performance of tone address signaling systems) The time interval between the end of the signal present condition and the beginning of the signal off condition at the end of the signal under consideration. (COM) 752-1986r

signal decorrelation time *See:* decorrelation time.

signal delay The transmission time of a signal through a network. The time is always finite, may be undesired, or may be purposely introduced. *See also:* delay line; oscillograph. (IM) [40]

signal, difference *See:* differential signal.

signal distance (1) (computers) The number of digit positions in which the corresponding digits of two binary words of the same length are different. *See also:* hamming distance. (COM/C) [20], 312-1977w

(2) (mathematics of computing) *See also:* hamming distance. (C) 1084-1986w

signal distributing (telephone switching systems) Delivering of signals from a common control to other circuits. (COM) 312-1977w

signal duration (measuring the performance of tone address signaling systems) The time interval during which a signal present condition exists continuously. (COM) 752-1986r

signal electrode (camera tubes) An electrode from which the signal output is obtained. *See also:* electrode. (BT) [34]

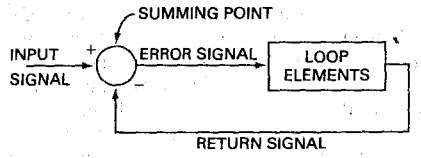
signal element (1) (data transmission) (unit interval) The part of a signal that occupies the shortest interval of signaling code. It is considered to be of unit duration in building up signal combinations. (PE) 599-1985w

(2) A signal element is the logical signal value during one half of a bit time and may take on the values of Logic_1 or Logic_0. (C/LM) 8802-5-1995

signal, error (1) (automatic control device) A signal whose magnitude and sign are used to correct the alignment between the controlling and the controlled elements. (EEC/PE) [119]

(2) (power supplies) The difference between the output voltage and a fixed reference voltage compared in ratio by the two resistors at the null junction of the comparison bridge. The error signal is amplified to drive the pass elements and correct the output. (AE/PE) [41], [78]

(3) (closed loop) (control system feedback) The signal resulting from subtracting a particular return signal from its corresponding input signal. (See the corresponding figure.) *See also:* control system, feedback.



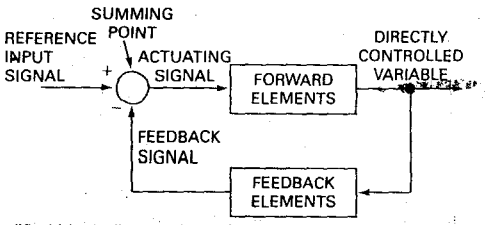
block diagram of a closed loop

signal, error

(PE) [3], 421-1972s

signal, feedback (1) (general) A function of the directly controlled variable in such form as to be used at the summing point. *See also:* control system, feedback. (IA) [60]

(2) (control system feedback) The return signal that results from the reference input signal. (See the corresponding figure.) *See also:* control system, feedback.



Simplified block diagram including essential elements of an automatic control system

signal, feedback

(PE) [3], 421-1972s

signal flow graph (network analysis) A network of directed branches in which each dependent node signal is the algebraic sum of the incoming branch signals at that node. *Note:* Thus,

$$x_1t_{1k} + x_2t_{2k} + \ldots + x_nt_{nk} = x_k$$

at each dependent node k, where t_{jk} is the branch transmittance of branch jk. (CAS) 155-1960r

signal frequency shift (frequency-shift facsimile system) The numerical difference between the frequencies corresponding to white signal and black signal at any point in the system. *See also:* facsimile signal. (COM) 168-1956w

signal generator A shielded source of voltage or power, the output level and frequency of which are calibrated, and usually variable over a range. *Note:* The output of known waveform is normally subject to one or more forms of calibrated modulation. (IM) [40]

signal ground For the purpose of this guide, shall be the grounding system to which signals are referenced. (PE) 1050-1996

signal identifier (spectrum analyzer) A means to identify the frequency of the input when spurious responses are possible. A front panel control used to identify the input frequency when spurious responses are present. (IM) 748-1979w

signal indication The information conveyed by the aspect of a signal. (EEC/PE) [119]

signaling (1) (data transmission) The production of an audible or visible signal at a station or switchboard by means of an alternating or pulsating current. In a telephone system, any of several methods used to alert subscribers or operators or to establish and control connections. (PE) 599-1985w

(2) (telephone switching systems) The transmission of address and other switching information between stations and central offices and between switching entities. (COM) 312-1977w

(3) The exchange of information specifically concerned with the establishment and control of connections, and the transfer of user-to-user and management information in a circuit-switched network. (C/LM) 802.9a-1995

(4) The exchange of information specifically concerned with the establishment and control of connections, and the transfer of user-to-user and management information in a telecommunication network, e.g., in a PPSN. (COM/C/LM) 8802-9-1996

signaling, analog A means of communicating between devices that uses continuously variable signals. (PE/SUB) 999-1992

signaling and doorbell transformers (power and distribution transformers) Step-down transformers (having a secondary of 30 V or less), generally used for the operation of signals, chimes, and doorbells. (PE) C57.12.80-1978r

signaling, binary A means of communicating between devices that uses two-state signals. Where multiple binary data bits are to be transferred, either multiple signaling paths ("parallel binary") or a time series of individual data bits ("serial binary") transmission methods are to be used. (PE/SUB) 999-1992

signaling circuit Any electric circuit that energizes signaling equipment. (NEC/NESC) [86]

signaling light (illuminating engineering) A projector used for directing light signals toward a designated target zone. (EEC/IE) [126]

signal, input (control system feedback) A signal applied to a system or element. See the figure attached to definition "3" of signal, error. *See also:* control system, feedback. (PE) [3], 421-1972s

signal integration The summation of a succession of signals by writing them at the same location on the storage surface. *See also:* storage tube. (ED) 158-1962w

signal interphasing A method of simultaneously overlapping multiple transmission signals to achieve higher transmission rates. (C) 610.7-1995

signal layer The layer of the protocol stack at which signals are specified. (BA/C) 1355-1995

signal level (1) (696 interface devices) (signals and paths) The magnitude of a signal when considered in relation to an arbitrary reference magnitude. (C/IM/MM) 488.1-1987r, 696-1983w

(2) (SBX bus) The relative magnitude of a signal when compared to a reference. (C/MM) 959-1988r

(3) (STEbus) The relative magnitude of a signal when considered in relation to an arbitrary reference. The unit of representation is the volt. (C/MM) 1000-1987r, 796-1983r

(4) (broadband local area networks) The measured voltage or power of a signal usually stated in dBmV. (C/LM) 802.7-1989

signal line (1) (696 interface devices) (microcomputer system bus) (programmable instrumentation) (signals and paths) One of a set of signal conductors in an interface system used to transfer messages among interconnected devices. (C/IM/MM) 488.1-1987r, 696-1983w, 796-1983r, 959-1988r

(2) (STEbus) One of a set of signal conductors in an interface system used to transfer data among interconnected boards. (C/MM) 1000-1987r

(3) (NuBus) A conductor on the backplane other than ground, or power. (C/MM) 1196-1987

(4) An electrical or optical information-carrying facility, such as a differential pair of wires or an optical fiber, with associated transmitter and receiver, carrying binary true/false logic values. (C/MM) 1596-1992

(5) An electrical or optical information-carrying facility, such as a differential pair of wires or an optical fiber, with associated driver and receiver, carrying binary true/false logic values. (C/MM) 1596.3-1996

signal lines The passive transmission lines through which the signal passes from one to another of the elements of the signal transmission system. *See also:* signal. (IE) [43]

signal names (1) Where a group of bus lines are represented by the same letters, the lines within the group are numbered, e.g., **AD0*, AD1*, AD2***, etc. In order to represent a group of lines or signals in more convenient form, the notation **AD[31..0]*** is used. Also, the notation **AD[]*** is used to refer to all of the lines within the group. (BA/C) 896.2-1991

(2) Where a group of bus lines are represented by the same letters, the lines within the group are numbered; e.g., AD0*, AD1*, AD2*, etc. In order to represent a group of lines or signals in more convenient form, notation such as AD[63..0]* is used. Also, in these examples, the notation AD[ ]* is used to refer to all of the lines within the group. (BA/C) 10857-1994

(3) Where a group of bus lines are represented by the same letters, the lines within the group are numbered, e.g., **AD0*, AD1*, AD2***, etc. In order to represent a group of lines or signals in more convenient form, the notation **AD[63..0]*** is used. Also, the notation **AD[]*** is used to refer to all of the lines within the group. (BA/C) 896.4-1993

signal negation The act of driving a signal to the false state. (BA/C) 1496-1993

signal off (measuring the performance of tone address signaling systems) Any condition where all the constituent tones of a tone signaling system are below a specified OFF level for each tone. In a single-tone signaling system, tone off and signal off are synonymous terms. *Note:* During a signal off condition, tones that are not used in the signaling system may be at a higher level. (COM) 752-1986r

signal operation (elevators) Operation by means of single buttons or switches (or both) in the car, and up-or-down direction buttons (or both) at the landings, by which predetermined landing stops may be set up or registered for an elevator or for a group of elevators. The stops set up by the momentary actuation of the car buttons are made automatically in succession as the car reaches those landings, irrespective of its direction of travel or the sequence in which the buttons are actuated. The stops set up by the momentary actuation of the up-and-down buttons at the landing are made automatically by the first available car in the group approaching the landing in the corresponding direction, irrespective of the sequence in which the buttons are actuated. With this type of operation, the car can be started only by means of a starting switch or button in the car. *See also:* control. (EEC/PE) [119]

signal, output (control system feedback) A signal delivered by a system or element. *See also:* control system, feedback. (NESC/PE) [86], 421-1972s

signal output current (camera tubes or phototubes) The absolute value of the difference between output current and dark current. *See also:* phototube. (BT/ED) [34], [45], 161-1971w

signal parameter (programmable instrumentation) That parameter of an electrical quantity whose values or sequence of values convey information. (C/IM/MM) 1000-1987r, 488.1-1987r, 696-1983w, 796-1983r

signal phase The initial phase of an exception operation in which all agents are notified of an error condition. *See also:* exception operation. (C/MM) 1296-1987s

signal present (measuring the performance of tone address signaling systems) Any condition where the presence of tone or tones is sufficient to be recognized as a valid digital or supervisory signal. In a single-tone signaling system, tone present and signal present are synonymous terms; in a two-tone signaling system the signal present state exists where two and only two tones each meet the signal present condition, and the two tones represent a valid combination. (COM) 752-1986r

signal processing antenna system An antenna system having circuit elements associated with its radiating element(s) that perform functions such as multiplication, storage, correlation, and time modulation of the input signals. (AP) 145-1993

signal propagation delay or transmission delay Total time for a signal to pass through the switching system. For digital-to-digital interfaces (DS1) where bit integrity is maintained, the delay is the time elapsed between transmission and reception of the bit that starts a known test pattern. For analog-to-analog, digital-to-analog, or analog-to-digital transmission, T1Q1 (a study group of the Exchange Carriers Standards Association) proposes that the delay be measured as the shift in time of the envelope of a 50% amplitude modulated test signal (or its digital equivalent) at the carrier frequency of minimum delay in the voiceband channel. (COM) 973-1990w

signal purity (network analyzers) A measure of freedom from frequency components other than the desired measurement frequency. It includes harmonics, subharmonics, spurious mixer products, and unwanted components of signal or local oscillator leakage. *Note:* The resulting error in measurement is a function of the detection system and of the frequency response of the network under test, as well as the signal purity. (IM) 378-1986w

signal quality error heartbeat A signal from the transceiver to a node peripheral indicating that the transceiver is functioning properly. *Note:* This term is contextually specific to IEEE Std 802.3. (C) 610.7-1995

signal queueing When queueing is enabled for a signal, occurrences of that signal are queued in FIFO order and informa-

master switch (electric installations on shipboard) A switch that dominates the operation of contactors, relays, or other remotely operated devices. *See also:* switch.
(IA) [60], 45-1983r

master terminal (1) A dedicated terminal that is reserved for the operator of the system or other authorized persons that are privileged to initiate conversations, and to control system-wide processes and operations. *Synonyms:* control terminal; operator console. (C) 610.10-1994
(2) *See also:* terminal, master. (PE/SUB) 999-1992

master terminal unit (station control and data acquisition) The master station of a supervisory control system. *See also:* master station; station.
(PE/SWG/SUB) C37.1-1994, C37.100-1992

mast-type antenna for aircraft A rigid antenna of streamlined cross section consisting essentially of a formed conductor or conductor and supporting body.
(EEC/PE) [119]

mat (rotating machinery) A randomly distributed unwoven felt of fibers in a sheetlike configuration having relatively uniform density and thickness. *See also:* rotor; stator.
(PE) [9]

MAT *See:* machine-aided translation.

match (A) A condition in which the values of corresponding components of two or more data items are equal. *See also:* hit. **(B)** To compare two or more data items to determine whether their corresponding components are equal as in definition "A." (C) 610.5-1990

matched A state applying to a sequence of zero or more characters when the characters in the sequence correspond to a sequence of characters defined by a BRE or ERE pattern.
(C/PA) 9945-2-1993

matched condition *See:* matched termination.

matched filter A filter that maximizes the output ratio of peak signal power to mean noise power. For white Gaussian noise, it has a frequency response that is the complex conjugate of the transmitted spectrum, or equivalently, has an impulse response that is the time inverse of the transmitted waveform.
(AE) 686-1990w

matched generator insertion gain (waveguide) A gain resulting from placing two ports of a network between a load having an arbitrary impedance and a matched generator. It is the ratio of the power absorbed in the load when connected to the generator (reference power) to that when the network is inserted. *Contrast:* matched generator insertion loss.
(MTT) 146-1980w

matched generator insertion loss (waveguide) A loss resulting from placing two ports of a network between a load having an arbitrary impedance and a matched generator. It is the ratio of the power absorbed in the load when connected to the generator (reference power) to that when the network is inserted. *Contrast:* matched generator insertion gain.
(MTT) 146-1980w

matched impedances Two impedances are matched when they are equal. *Note:* Two impedances associated with an electric network are matched when their resistance components are equal and when their reactance components are equal. *See also:* network analysis. (Std100) 270-1966w

matched insertion gain (waveguide) A gain resulting from placing two ports of a network between a matched generator and a matched load. It is the ratio of the power absorbed in the load when connected to the generator (reference power) to that when the network is inserted. *Contrast:* matched insertion loss.
(MTT) 146-1980w

matched insertion loss (waveguide) A loss resulting from placing two ports of a network between a matched generator and a matched load. It is the ratio of the power absorbed in the load when connected to the generator (reference power) to that when the network is inserted. *Contrast:* matched insertion gain.
(MTT) 146-1980w

matched load insertion gain (waveguide) A gain resulting from placing two ports of a network between a generator having an arbitrary impedance and a matched load. It is the ratio of the power absorbed in the load when connected to the generator (reference power) to that when the network is inserted. *Contrast:* matched load insertion loss.
(MTT) 146-1980w

matched load insertion loss (waveguide) A loss resulting from placing two ports of a network between a generator having an arbitrary impedance and a matched load. It is the ratio of the power absorbed in the load when connected to the generator (reference power) to that when the network is inserted. *Contrast:* matched load insertion gain.
(MTT) 146-1980w

matched terminated line (waveguide) A transmission line having no reflected wave at any transverse section.
(MTT) 146-1980w

matched termination (waveguide components) A termination matched with regard to the impedance in a prescribed way; for example, a reflectionless termination or a conjugate termination. (MTT) 147-1979w

matched transmission line (data transmission) A transmission line is said to be matched at any transverse section if there is no wave reflection at that section.
(PE) 599-1985w

matched waveguide *See:* matched terminated line.

matching *See:* image matching.

matching, impedance *See:* load matching.

matching interaction An instruction method employed by some computer-assisted instruction systems, in which the student is asked to match answers to questions.
(C) 610.2-1987

matching, load *See:* load matching.

matching loss (1) (radar) The loss in S/N (signal-to-noise) output relative to a matched filter, caused by using a filter of other than matched response to the transmitted signal. *Synonym:* mismatch loss. (AE) 686-1982s
(2) (telecommunications) The net probability of not being able to establish a network path between an originating line or incoming trunk and a terminating line or trunk when the terminating line or trunk is idle. *Synonym:* overflow loss.
(COM) 973-1990w

matching section (waveguide) (waveguide transformer) (transforming section) A length of waveguide of modified cross section, or with a metal or dielectric insert, used for impedance transformation. *See also:* waveguide.
(AP) [35]

matching transformer (induction heater) A transformer for matching the impedance of the load to the optimum output characteristic of the power source. (IA) 54-1955w

material (nuclear power generating station) A substance or combination of substances used as constituents in the manufacture of components, modules, or items. *Note:* This term applies specifically to the subject matter of IEEE Std 467-1980. (PE) 467-1980w

material absorption *See:* absorption.

material dispersion (fiber optics) That dispersion attributable to the wavelength dependence of the refractive index of material used to form the waveguide. Material dispersion is characterized by the material dispersion parameter M. *See also:* dispersion; distortion; material dispersion parameter; profile dispersion parameter; waveguide dispersion.
(Std100) 812-1984w

material dispersion parameter (M) (fiber optics)

$$M(\lambda) = -1/c(dN/d\lambda) = \lambda/c(d^2n/d\lambda^2)$$

where n is the refractive index, N is the group index: $N = n - \lambda(dn/d\lambda)$, λ is the wavelength, and c is the velocity of light in vacuum. *Notes:* 1. For many optical waveguide materials, M is zero at a specific wavelength λ_0, usually found

(2) A general term covering the process of maintaining existing power switchgear equipment in operating condition as recommended by the manufacturer's instructions, using only the original manufacturer's recommended replacement parts, without altering the original design. (PE/SWG) C37.100-1992

(3) The process of maintaining existing power switchgear equipment in operating condition as recommended by the manufacturer's instructions, using only the original manufacturers' designed parts. *Note:* Reverse engineered parts (designs copied from existing parts by other manufacturers) are not considered to be the original manufacturer's design or recommended replacement parts. (PE/SWG) C37.59-1996

reconditioning of oil The mechanical removal of moisture and insoluble contaminants. (PE) C57.106-1991

reconfiguration (1) (dual ring operation with wrapback reconfiguration) A change of the path around which the token that is used for normal data transfer circulates. (C/LM) 802.5c-1991

(2) (DQDB subnetwork of a metropolitan area network) The process by which the configuration control function activates and deactivates resources of a DQDB subnetwork to take account of a change in the operational status of a cluster, node, or transmission link in the subnetwork. (C/LM) 8802-6-1994

(3) A strategy for repairing components in which failing components are switched out of operation and replaced by failure-free components. (C) 610.10-1994

reconfiguration management The management functions responsible for reconfiguration. This includes both dual ring management and any other management required for reconfiguration. (C/LM) 802.5c-1991

reconstituted mica *See:* mica paper.

reconstruction (1) Replacement of any portion of an existing installation by new equipment or construction. Does not include ordinary maintenance replacements. (NESC) C2-1977s

(2) (image processing and pattern recognition) *See also:* image reconstruction. (C) 610.4-1990

record (1) (data management) (software) A set of data items, called fields, treated as a unit. For example, in stock control, the data for each invoice could constitute one record. *Synonym:* data record. *See also:* database record; entity. (C) 610.12-1990, 610.5-1990

(2) The language-independent syntax for a family of datatypes constructed from a sequence of base datatypes, each associated with a name. A value of record datatype contains, for each name, a value of the corresponding base datatypes. (C/PA) 1351-1994

(3) A set of related data items treated as a unit. For example, in stock control, the data for each invoice could constitute one record. (C) 610.7-1995

(4) To put data into a storage device. (C) 610.10-1994

(5) A datatype constructed from a sequence of base datatypes, each associated with a name. A record value contains, for each name, a value of the corresponding base datatype. (C/PA) 1224.1-1993

(6) A collection of related data or words treated as a unit and saved in a position-dependent fashion within a file of other such units. (C/MM) 855-1990

record condition (data management) A conjunction of two or more item conditions such that the name of the data item in each condition is distinct. For example, "LASTNAME = 'JONES' and SEX = 'FEMALE.'" (C) 610.5-1990

recorded announcement (telephone switching systems) A prerecorded oral message received on a call. (COM) 312-1977w

recorded spot, X dimension (facsimile) The effective recorded-spot dimension measured in the direction of the recorded line. *Notes:* 1. By effective dimension is meant the largest center-to-center spacing between recorded spots which gives minimum peak-to-peak variation of density of the recorded line. 2. This term applies to that type of equipment which responds to a constant density in the subject copy by a succession of discrete recorded spots. *See also:* recording. (COM) 168-1956w

recorded spot, Y dimension (facsimile) The effective recorded-spot dimension measured perpendicularly to the recorded line. *Note:* By effective dimension is meant the largest center-to-center distance between recorded lines which gives minimum peak-to-peak variation of density across the recorded lines. *See also:* recording. (COM) 168-1956w

recorded value The value recorded by the marking device on the chart, with reference to the division lines marked on the chart. *See also:* accuracy rating. (EEC/PE) [119]

recorder (1) (analog computer) A device that makes a permanent record, usually graphic, of varying signals. *Synonym:* strip chart recorder. (C) 165-1977w, 610.10-1994

(2) (facsimile) That part of the facsimile receiver which performs the final conversion of electric picture signal to an image of the subject copy on the record medium. *See also:* facsimile; recording. (COM) 168-1956w

recorder, strip-chart (analog computer) (hybrid computer linkage components) A recorder in which one or more records are made simultaneously as a function of time. *See also:* electronic analog computer. (C) 165-1977w, 166-1977w

recorder-warning tone (telephone switching systems) A tone that indicates periodically that the conversion is being electrically recorded. (COM) 312-1977w

record gap (1) (computers) (storage medium) An area used to indicate the end of a record. (C) [20], [85]

(2) (test, measurement, and diagnostic equipment) An interval of space or time associated with a record to indicate or signal the end of the record. (MIL) [2]

(3) *See also:* interblock gap. (C) 610.5-1990

(4) *See also:* interblock gap. (C) 610.10-1994

record head *See:* read/write head.

recording (1) (facsimile) The process of converting the electrical signal to an image on the record medium. *See also:* electrochemical recording; electrolytic recording; electromechanical recording; electrostatic recording; electrothermal recording; magnetic recording; photosensitive recording. (COM) 168-1956w

(2) The process of storing information on some storage medium for later retrieval. *See also:* magnetic recording; optical recording. (C) 610.10-1994

recording area (1) In micrographics, the maximum useful area of a microfilm or other medium that can record information, including the image as well as the document marks. (C) 610.2-1987

(2) The area on a disk or storage medium on which information can be recorded. *Synonym:* recording zone. *Contrast:* handling zone. (C) 610.10-1994

recording channel (electroacoustics) The term refers to one of a number of independent recorders in a recording system or to independent recording tracks on a recording medium. *Note:* One or more channels may be used at the same time for covering different ranges of the transmitted frequency band, for multichannel recording, or for control purposes. *See also:* phonograph pickup. (SP) [32]

recording-completing trunk (telephone switching systems) A one-way trunk for operator recording, extending, and automatic completing of toll calls. (COM) 312-1977w

recording demand meter A demand meter that records on a chart the demand for each demand interval. *See also:* electricity meter. (EEC/PE) [119]

recording density The number of bits in a single linear track, measured in bits per unit of length or area of the recording medium. *Synonyms:* bit density; packing density; surface density. *See also:* track density. (C) 610.10-1994

recording, instantaneous (mechanical recording) A phonograph recording that is intended for direct reproduction with-

in such sound. *Note:* In practice, crosstalk may be measured either by the volume of the overheard sounds or by the magnitude of the coupling between the disturbed and the disturbing channels. In the latter case, to specify the volume of the overheard sounds, the volume in the disturbing channel must also be given. (PE) 599-1985w

(3) Unwanted electric signals injected into a circuit by stray coupling. (ELM) C12.1-1981

(4) (instrumentation and control equipment grounding in generating stations) The noise or extraneous signal caused by ac or dc pulse-type signals in adjacent circuits. (PE) 1050-1996

(5) (telecommunications) Undesired energy appearing in one path as a result of coupling from another path. Crosstalk is further classified as near-end, far-end, intelligible, or unintelligible. (COM) 1007-1991

(6) (telecommunications) Unwanted coupling between any two paths through the switching system. There are two situations of interest. In the first the crosstalk coupling loss of the system is linear; that is it is independent of applied disturbing signal level and is unaffected by other things, such as circuit noise. The other situation of interest arises with a digital switching system where the crosstalk coupling loss is nonlinear and is a function of applied disturbing signal level circuit noise, and encoder bias. Such systems will, under some conditions of circuit noise and coder bias, display crosstalk coupling loss that tends to decrease with decreasing disturbing signal level. *See also:* crosstalk coupling loss; equal-level crosstalk coupling loss. (COM) 973-1990w

(7) (multichannel) The ratio of the signal induced in one channel to a common signal applied to all other channels. (IM) 1057-1994

(8) The noise or extraneous signal caused by ac or pulse-type signals in adjacent circuits (measurement of power frequency magnetic fields). (PE/T&D) 1308-1994, 644-1994

(9) An electromagnetic field in the space surrounding a cable circuit created by an electrical signal. This field induces currents and electromotive forces in other circuits located close enough to the disturbing cable circuit to be affected. (PE) 1143-1994

(10) (A) A type of noise characterized by unwanted coupling of a signal or the interaction of signals on two adjacent channels. *See also:* near end crosstalk. **(B)** Undesired energy appearing in one signal path as a result of coupling from other signal paths. (C) 610.7-1995

(11) Crosstalk is undesired energy appearing in one signal path as a result of coupling from other signal paths. (C/LM) 8802-5-1995

crosstalk coupling (crosstalk loss) Cross coupling between speech communication channels or their component parts. *Note:* Crosstalk coupling is measured between specified points of the disturbing and disturbed circuits and is preferably expressed in decibels. *See also:* coupling. (EEC/PE) [119]

crosstalk coupling loss (telecommunications) The loss of the crosstalk path. *See also:* crosstalk. (COM) 973-1990w

crosstalk, electron beam (charge-storage tubes) Any spurious output signal that arises from scanning or from the input of information. *See also:* charge-storage tube. (ED) 158-1962w

crosstalk loss *See:* crosstalk coupling.

crosstalk unit Crosstalk coupling is sometimes expressed in crosstalk units through the relation

$$\text{Crosstalk units} = 10^{[6-(L/20)]}$$

where L = crosstalk coupling in decibels. *Note:* For two circuits of equal impedance, the number of crosstalk units expresses the current in the disturbed circuit as millionths of the current in the disturbing circuit. *See also:* coupling. (EEC/PE) [119]

crowbar A protective circuit in a power distribution circuit that rapidly shorts the output voltage to ground when an overvoltage or other error condition occurs. (C) 610.10-1994

CR-RC shaping (1) (charged-particle detectors) (germanium gamma-ray detectors) (x-ray energy spectrometers) The pulse shaping present in an amplifier that has a simple high-pass filter consisting of a capacitor and a resistor together with a simple low-pass filter, separated by impedance isolation. (Pulse shaping in such an amplifier cuts off at 6 dB (decibels) per octave at both ends of the band.) (NPS) 301-1976s, 325-1986s, 759-1984r

(2) (semiconductor charged-particle detectors) In an amplifier, the pulse shaping produced by a single-section high-pass network followed by a single-section low-pass network, with the two networks separated by an isolating stage and with both networks having the same time constant. (NPS) 300-1988r

CRS *See:* configuration report server.

CRT *See:* cathode-ray tube.

CRT display device A display device that displays data onto a phosphor coated display screen using controlled electron beams within a CRT. *Note:* Raster display devices and random-scan display devices are two major categories of CRT display devices. *See also:* dark trace tube display device; penetration CRT display device; raster display device; storage tube display device. (C) 610.10-1994

crude metal Metal that contains impurities in sufficient quantities to make it unsuitable for specified purposes or that contains more valuable metals in sufficient quantities to justify their recovery. *See also:* electrorefining. (EEC/PE) [119]

crust A layer of solidified electrolyte. *See also:* fused electrolyte. (EEC/PE) [119]

CRV *See:* Code Rule Violation.

cryogenics (1) (general) The study and use of devices utilizing properties of materials near absolute-zero temperature. (C) [20], [85]

(2) (laser maser) The branch of physics dealing with very low temperatures. (LEO) 586-1980w

(3) A branch of technology concerned with devices that make use of the properties assumed by materials at temperatures near absolute zero. (C) 610.2-1987

cryogenic storage A type of storage that uses the superconductive and magnetic properties of certain materials at temperatures near absolute zero. (C) 610.10-1994

cryotron (1) A superconductive device in which current in one or more input circuits magnetically controls the superconducting-to-normal transition in one or more output circuits, provided the current in each output circuit is less than its critical value. *See also:* superconductivity. (ED) [46]

(2) A device that makes uses of the effects of extremely low temperatures on conductive materials such that small magnetic field changes can control large current changes. (C) 610.10-1994

cryptographic checkvalue Information that is derived by performing a cryptographic transformation on the data unit. *See also:* cryptography. (C/LM) 802.10-1992

cryptography The discipline embodying principles, means, and methods for the transformation of data in order to hide its information content, prevent its undetected modification, and/or prevent its unauthorized use. (C/LM) 802.10-1992

crystal (A) (communication practice) A piezoelectric crystal. **(B) (communication practice)** A piezoelectric crystal plate. **(C) (communication practice)** A crystal rectifier. (EEC/PE) [119]

crystal-controlled oscillator *See:* crystal oscillator.

crystal diode A rectifying element comprising a semiconducting crystal having two terminals designed for use in circuits in a manner analogous to that of electron-tube diodes. *See also:* rectifier. (EEC/PE) [119]

crystal loudspeaker (piezoelectric loudspeaker) A loudspeaker in which the mechanical displacements are produced by piezoelectric action. (EEC/PE) [119]

crystal microphone (piezoelectric microphone) A microphone that depends for its operation of the generation of an